

Technology Opportunity

Technology Transfer & Partnership Office

TOP3-00214

Electric Propulsion Research Building

Facility

The Electric Propulsion Research Building (EPRB) supports research in the areas of electric propulsion, spacecraft power, and space environmental effects at the component and conceptual levels (TRL 2–7).

Facility Description

The EPRB has played a role in propulsion and power development for over 60 years. Originally it tested piston engines supporting U.S. World War II efforts. For the last 40 years, electric propulsion has been the focus of this facility providing the technology development necessary for NASA to explore the solar system. EPRB supports research and development of spacecraft power, electric propulsion, and space environmental effects. Presently, EPRB is supporting research focused on ion thrusters, magneto-plasma dynamic thrusters, pulsed plasma thrusters, Stirling engine converters, regenerative fuel cells, space plasma potentials, and atomic oxygen.

The cornerstone to EPRB's research capabilities results from its suite of space simulation chambers. EPRB chambers range in size from bench top bell jars to 3 meters in diameter and are equipped with various pumping systems (cryopumps, diffusion pumps, oil-free pumping trains, and high-throughput roots blowers) depending upon the specific requirements of a test program. In addition, EPRB has over 20,000 sq ft of specialty labs and buildup and machine shop areas. EPRB works synergistically with other larger vacuum facilities located at GRC.

Facility Benefits

Vacuum facilities

Seven vacuum chambers

Over half-dozen bell jars

Production and assembly capabilities

Grid hydroforming rig

- Up to 50 cm in diameter

Clean rooms

- Class 10,000: 21 sq meters
- Class 100,000: 40 sq meters

Machine shop



Thermal vacuum environmental testbed at VF-10.

Programs and Projects Supported

- In-Space
- Prometheus
- Energetic
- International Space Station
- Jupiter Icing Moon Orbiter (JIMO)

Facility Testing Information

<http://facilities.grc.nasa.gov>

Contacts

S. Michelle Doehne, Facility Manager

NASA Glenn Research Center

Phone: 216-433-8636

Fax: 216-433-8551

E-mail: Sandra.M.Doehne@nasa.gov

Technology Transfer & Partnership Office

E-mail: ttp@grc.nasa.gov

<http://technology.grc.nasa.gov>

Capabilities

Space Simulation Facilities—Electric Propulsion Research Building					
Vacuum Facility	Dimensions (diam by length)	Vacuum system	No load pressure, torr	Pumping speed liter/sec, air	Features
VF-1	5 by 15 ft long	(2) 35-in. ODP	3×10^{-7}	40,000	250 kJ, 30 MW, pulsed capacitor bank supporting high power electric propulsion research
VF-2	3.5 by 7 ft long	Turbopump	1×10^{-6}	1,950	
VF-3	5 by 15 ft long	(4) 35-in ODP	4×10^{-7}	80,000	Multiple test ports
VF-4	5 by 15 ft long				Currently non-operational
VF-7	10 by 15 ft long	(5) 35-in. diffusion pumps	1×10^{-7}	125,000	Operation in 2005
VF-9	2 wide by 5 long by 8 ft high	Roots blower pumps	1×10^{-3}	3,000 cfm	Atomic oxygen production
VF-10	40 by 60 in. long	Turbo pump	8×10^{-7}	1,950	Cold wall 35 in. diam by 40 in. long Control: -250 to 300 °F or (-320 °F)
VF-11	7.25 by 27 ft long	(3) 48-in cryotubs (4) 36-in cryotubs	1×10^{-7}	270,000	EP thruster testbed
VF-14	22 by 22 by 36 in.	Turbopump	5×10^{-7}	1,000	
VF-16	10 by 25 ft long	(10) 48-in. cryopumps	7×10^{-8}	500,000	Electrostatic propulsion test facility, and supports long-duration testing
VF-61	40 by 60 in. long	36-in. cryopumps	3.5×10^{-8}	30,000	Multiple test ports
CW-19	7 by 10 ft	(2) 35-in ODP with dual baffles of LN ₂ and water	5×10^{-7}	25,000	
PIF-H	71 by 72 in.	36-in. cryotub	1×10^{-6}	30,000	Space plasma test facility Thermal shroud available upon request
PIF-V	6 by 9.5 ft	(4) 10-in. ODP	5×10^{-7}	5,300	Space plasma test facility